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Martijn, H., R. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). MEINDERS, Erwin, R. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). WOLTERS, Robertus, A., M. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). WIDDER-SHOVEN, Franciscus, P. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

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(74) Agent: DULJVESTIJN, Adrianus, J.; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

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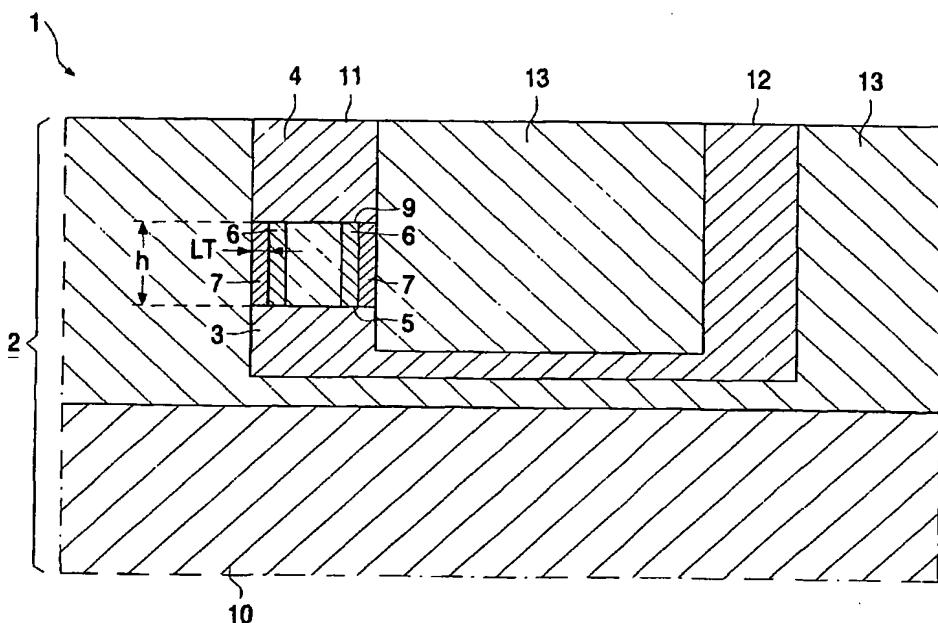
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[Continued on next page]

(54) Title: ELECTRIC DEVICE WITH PHASE CHANGE MATERIAL AND PARALLEL HEATER



(57) **Abstract:** The electric device (1, 100) has a body (2, 102) having a resistor (7, 107) comprising a phase change material being changeable between a first phase and a second phase. The resistor (7, 107) has a first electrical resistance when the phase change material is in the first phase and a second electrical resistance, different from the first electrical resistance, when the phase change material is in the second phase. The body (2, 102) further has a heating element (6, 106) being able to conduct a current for enabling a transition from the first phase to the second phase. The heating element (6, 106) is arranged in parallel with the resistor (7, 107).

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# INTERNATIONAL SEARCH REPORT

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**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H01L27/24 H01L45/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX, IBM-TDB

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/039310 A1 (CHIANG CHIEN ET AL) 4 April 2002 (2002-04-04) paragraphs '0029!, '3032!, '0033!, '0047!, '0049! - '0051!, '0053!, '0060!; figures 1,14,18	1,4,5, 7-12
X	US 5 933 365 A (KLERSY PATRICK ET AL) 3 August 1999 (1999-08-03) column 15, line 5 - column 17, line 15; figures 1,3	1-3,5, 11,12
P,X	EP 1 331 675 A (ST MICROELECTRONICS SRL ; OVONYX INC (US)) 30 July 2003 (2003-07-30) paragraphs '0001! - '0004!, '0717!, '0018!, '0020!, '0026!; figure 4	1,2,4, 7-10

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Laenen, R

**INTERNATIONAL SEARCH REPORT**

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Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 2002039310	A1	04-04-2002	US	6339544 B1		15-01-2002
			US	2004051128 A1		18-03-2004
US 5933365	A	03-08-1999	AU	8148298 A		04-01-1999
			CA	2269857 A1		23-12-1998
			EP	0938731 A1		01-09-1999
			RU	2214009 C2		10-10-2003
			TW	421893 B		11-02-2001
			WO	9858385 A1		23-12-1998
EP 1331675	A	30-07-2003	EP	1331675 A1		30-07-2003
			US	2003161195 A1		28-08-2003